

REMARKS

Claim 1 has been amended. Support for the amendment to claim 1 may be found in the specification at, for example, page 7, line 15. Thus, claims 1-10 remain pending in the present application. No new matter has been added. Reconsideration and withdrawal of the present rejections in view of the comments presented herein are respectfully requested.

Rejections under 35 U.S.C. § 112, second paragraph

Claims 1, 3, 4 and 7-10 were rejected under 35 U.S.C. § 112, second paragraph as allegedly being indefinite. The Examiner contends that it is unclear if the claim language means the reaction product of (A)+(B)+(C)+(D) as written. Claim 1 as amended clearly recites that the chemically amplified positive photosensitive thermosetting resin composition comprises the following three components:

- a reaction product of (A) an alkali soluble resin having a phenolic hydroxyl group and (C) a crosslinking polyvinyl ether compound [(A) + (C)]
- (B) a compound generating an acid under irradiation with radiation [and]
- (D) an epoxy resin

In view of these amendments, Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. §112, second paragraph.

Rejections under 35 U.S.C. 103(a)

Ichikawa et al (US2002/0102501) in view of Kondo et al (EP0609684A1) and Kondo et al (EP0702271A1)

Claims 1, 3-4, and 8-10 were rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Ichikawa et al (US2002/0102501) in view of Kondo et al (EP0609684A1) and Kondo et al (EP0702271A1). However, as explained below, this combination of references would not render the presently claimed invention obvious. In particular, as discussed below, the Ichikawa et al. reference teaches away from the claimed combination. As such, it would be improper to combine Ichikawa et al. with the Kondo. *See* MPEP 2141.02.

At page 4 of the Office Action, the Examiner alleges that:

the use of polyvinyl ethers would have been *prima facie* obvious to make the acrylated monomeric units which would be polymerized thus having in the free radically cured stage of the invention of US 2002/102501 a composition which makes obvious the instant composition and the element formed therefrom when considering the teachings of Kondo et al (EP 0 609 684 A1) and Kondo et al (EP 0 702 271 A1) where positive chemically amplified positive photosensitive compositions comprising a compound having at least two enol ether groups yields

a composition with high development latitude in comparison to a composition having been made of vinyl ether.

However, with respect to compositions using a multifunctional vinyl ether compound,

Ichikawa teaches the following in paragraph [0012]:

It may well be concluded that the composition which contains in combination the polycarboxylic acid resin, the multifunctional vinyl ether compound, and the compound capable of generating an acid on exposure to the active energy ray as mentioned above can basically answer the recent demand for the formation of very fine circuit patterns. Since this composition contains the multifunctional vinyl ether compound, however, it has the problem that the resist coating suffers the sensitivity and the resolving power thereof to be altered by the heating conditions and the like. Specifically, since the multifunctional vinyl ether compound which functions as a cross-linking agent for the polycarboxylic acid resin in the composition has high volatility, it is liable to volatilize during the course of the primary heating and change its content in the coating film. As a result, the composition has the problem that it fails to retain the sensitivity and the resolving power constant because the conversion of the carboxyl group and the vinyl ether group (the density of cross-linkage of the polycarboxylic acid resin) is varied by the conditions of the heating temperature, etc. Further, since the reaction of the carboxyl group with the multifunctional vinyl ether compound proceeds even at normal room temperature, the composition cannot be easily used unless it is prepared in the form of a two-component type composition. Thus, the composition is unfit for an etching resist. Further, the application of the composition of this nature to a substance poses the problem of polluting the environment because it requires use of an organic solvent. (Emphasis added).

Further, in paragraph [0017], Ichikawa describes the object of their invention as follows:

“ primary object of the present invention, therefore, is to provide a photosensitive resin composition which contains no organic solvent and, therefore, avoids inducing the otherwise possible evaporation of an organic solvent to cause environmental pollution or volume shrinkage of a dried coating film, and proves to be useful for the formation of a varying resin adhesive layer, the formation of the coating film of such a resist as etching resist or solder resist in a printed circuit board, and particularly the formation of a resin insulating layer containing via holes in the production of a multilayer printed circuit board. (Emphasis added).

Thus, Ichikawa explicitly teaches away from the use of a multifunctional vinyl ether compound as recited in the present claims. As set forth in MPEP 2141.02, A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. In this instance, the prior art teaches that multifunctional vinyl ether compounds are unsuitable unless prepared in the form a two component compositions. Thus, it would be improper to consider this reference as a disclosure of “a reaction product of (A) an alkali soluble resin having a phenolic hydroxyl group and (C) a crosslinking polyvinyl ether”

unless present in the two-component type composition described by Ichikawa. In view of this teaching away, the combination of references cited by the Examiner fails to establish a *prima facie* showing of obviousness with respect to the presently pending claims.

Nakashima et al. (US 6,309,796)

Claims 1, 3-4 and 8/7/1, 3-4 through 10/9/1,3-4 were rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Nakashima et al. (US 6,309,796).

Present claim 1 as amended recites that the alkali soluble resin (A) has a phenolic hydroxyl group. In contrast, Nakashima teaches a negative resist composition comprising a crosslinked silicone resin which does not have a phenolic hydroxyl group. With respect to resins having a phenolic hydroxyl group, Nakashima teaches the following at column 2, lines 9-28:

Recently, as the silicone based positive resist material capable of solving these problems, chemically amplified silicone based positive resist materials comprising polyhydroxybenzylsilsesquioxane, known as a stable alkali soluble silicone polymer, in which some phenolic hydroxyl groups are protected with t-Boc groups, and photoacid generators combined therewith were proposed (Japanese Patent Application Kokai (JP-A) No. 118651/1995 and SPIE, Vol. 1952 (1993), 377). However, the polymers used in these silicone resist materials have aromatic rings, which cause substantial light absorption at a wavelength of 220 nm or shorter. Thus these prior art resins as such cannot be applied to photography using light of a short wavelength of 220 nm or shorter. Since the majority of exposure light is absorbed at the surface of resist, exposure light does not penetrate through the resist to the substrate, failing to form a fine resist pattern. (See Sasago et al., "ArF Excimer Laser Lithography (3)--Resist Rating--," the preprint of the 35th Applied Physics Society Related Union Meeting, 1P-K4 (1989)). (Emphasis added).

Further, at column 6, lines 25-50, Nakashima teaches the following:

More particularly, aside from phenyl-bearing silicone polymers as disclosed in JP-A 118651/1994, we have investigated and sought for a polymer in which alkali-soluble groups are not entirely, but partially, protected with acid labile groups, and which provides a high transmittance to light in the deep-UV region and a high resolution. On the other hand, known phenyl-free silicone polymers include a silicone polymer having an ethylcarboxyl group as disclosed in JP-A 323611/1993. When a polysiloxane having hydrogen atoms is reacted with an unsaturated carboxylic acid such as methacrylic acid as in this synthesis process, it is difficult to obtain a silicone polymer as illustrated in JP-A 323611/1993 because of preferential occurrence of addition reaction at the α -position of the unsaturated carboxylic acid. Since effecting hydrosilylation reaction on polymers is difficult in a quantitative sense, it is difficult to provide a constant supply of silicone polymer. Further, the quality control of resist is difficult. As opposed to these polymers, a resist composition comprising a silicone polymer obtained by introducing acid labile groups into some of the carboxyl groups of an aromatic ring-free high molecular weight silicone compound is highly transmissive to light

of a short wavelength of 220 nm or shorter and can form a pattern with such exposure light. The present invention is predicated on this finding. (Emphasis added).

Thus, like Ichikawa discussed above, Nakashima explicitly teaches away from the use of a phenolic group-containing resin. Accordingly, the claims are patentable over Nakashima for the same reasons discussed above in connection with Ichikawa.

In addition, at page 6 of the Office Action, the Examiner contends that although the composition of Nakashima is used in negative imaging processes, the intended use does not act to limit the obviousness of the actual composition unless the composition set forth would not due to its chemical nature be able to act in the intended way. In the present invention, the epoxy resin (D) has properties such that crosslinking does not proceed upon prebaking and post-exposure baking, but proceeds upon postbaking (specification at page 28, lines 3-7). In contrast, Nakashima uses a crosslinkable compound by the action of acid (i.e., upon post-exposure baking). As is well known in the art, in a negative imaging process, the exposed portions of the resist film become alkali insoluble upon post-exposure baking, so that the unexposed portions (which are alkali soluble) can be removed by alkali developing to thereby form a pattern. On the other hand, in a positive imaging process, the exposed portions of the resist film become alkali soluble upon post-exposure baking, so that the exposed portions can be removed by alkali developing while leaving the alkali-insoluble unexposed portions, to thereby form a pattern. Thus, the negative composition of Nakashima would not function as a positive resist composition as presently claimed.

Meier et al. (US 4,994,346)

Claims 2, 5 and 9-10 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Meier (US 4,994,346).

At pages 6-7 of the Office Action, the Examiner alleges that Meier teaches the instant compositions of claims 2, 5 and 9-10, with the exception of an explicit working example using both a polyfunctional epoxy resin and a polyfunctional vinyl ether compound, and using the compositions for negative photo resist imaging. However, as described above, a negative resist composition cannot function as a positive resist composition.

As set forth in MPEP 2143.01(VI), it is well settled that a “proposed modification cannot change the principle of operation of a reference. This section of the MPEP has already been revised in light of the KSR decision, as it includes a part (IV) specifically addressing KSR. Thus,

KSR did not alter this well-settled rule of nonobviousness. Since a negative resist composition cannot function as a positive, the modification proposed by the Examiner would require a complete change of principle of the operation of the reference. As such, the modification would not be obvious to one having ordinary skill in the art.

More specifically, in the presently claimed invention, the crosslinking polyvinyl ether compound (C) is crosslinked with the alkali soluble resin (A) upon prebaking, and then the crosslinking is decomposed by the action of acid generated upon exposure (specification at page 11, line 21 to page 12, line 4). Further, as described above, the epoxy resin (D) has properties such that crosslinking does not proceed upon prebaking and post-exposure baking, but proceeds upon postbaking (see page 28, lines 3-7). On the other hand, the composition of Meier comprises (c1) at least one cationic photoinitiator for component (b1) (at least one polyfunctional epoxy resin and/or a polyfunctional vinyl ether compound), thus the component (b1) of Meier crosslinks by the action of acid. Thus, the negative composition of Meier would not function as a positive resist composition as claimed in the present application.

Therefore, a person of ordinary skill in the art would not modify the teachings of Meier to arrive at the presently claimed invention.

Knudsen et al. (US 5,262,280)

Claims 2, 5 and 9-10 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Knudsen et al. (US 5,262,280).

Knudsen also teaches a negative resist composition,. However, as described above, a negative resist composition cannot function as a positive resist composition. Accordingly, the claimed invention is patentable over the Knudsen et al. reference for the same reasons described above in connection with Meier.

More specifically, as described above, the crosslinking polyvinyl ether compound (C) is crosslinked with the alkali soluble resin (A) upon prebaking, and then the crosslinking is decomposed by the action of acid generated upon exposure (see specification at page 11, line 21 to page 12, line 4). Further, as described above, the epoxy resin (D) has properties such that crosslinking does not proceed upon prebaking and post-exposure baking, but proceeds upon postbaking (see page 28, lines 3-7). On the other hand, Knudsen explicitly teaches that care should be taken to prevent premature crosslinking of the composition (see column 14, lines 28-32), and the photogenerated acid initiates a reaction of one or more of the polymerizable

components of the composition (see column 2, line 63 to column 3, line 2, and column 14, lines 39-41). Thus, the negative composition of Knudsen would not function as a positive resist composition as claimed in the present application. Therefore, a person of ordinary skill in the art would not modify the teachings of Knudsen et al. to arrive at the presently claimed invention.

In view of the comments presented above, Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. §103(a).

No Disclaimers or Disavowals

Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, Applicant is not conceding in this application that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. Applicant reserves the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that Applicant has made any disclaimers or disavowals of any subject matter supported by the present application.

CONCLUSION

Applicants submit that all claims are in condition for allowance. No fees are believed to be due. However, if any fees are required, including fees for an extension(s) of time, please charge these to Deposit Account No. 11-1410. Should there be any questions concerning this application, the Examiner is respectfully invited to contact the undersigned at the telephone number appearing below.

Respectfully submitted,

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